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ABSTRACT

Many school staff and their client communities are concerned about pupil achievement, skills, and attitudes related to mathematics. To respond to these concerns, staff need to determine how they can improve their secondary mathematics programs by modifying the content and skills emphasized in the curriculum, changing and supplementing instructional approaches, and changing the use of technology. In this digest, sources of curricular frameworks, sources of information on materials and programs which have evaluation data, and sources of information on promising programs and materials are discussed. Highlighted are the National Diffusion Network and the National Science Foundation. A list of four selected information sources with addresses is included. Eleven references are listed. (CW)

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SOURCES OF INFORMATION ABOUT PROMISING AND EXEMPLARY PROGRAMS AND MATERIALS FOR SECONDARY SCHOOL MATHEMATICS

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SOURCES OF INFORMATION ABOUT PROMISING AND EXEMPLARY PROGRAMS AND MATERIALS FOR SECONDARY SCHOOL MATHEMATICS

Many school staff and their client communities are concerned about pupil achievement, skills, and attitudes related to mathematics. To respond to these concerns, staff need to determine how they can improve their mathematics programs by modifying the content and skills emphasized in the curriculum, changing or supplementing instructional materials, and changing instructional approaches, and changing the use of technology.

What should be included in a secondary school mathematics program?

There are several publications available to use to determine what a mathematics program should include. Several states including California, Michigan, New York, and Wisconsin have produced state guides or frameworks suggesting what should be included in a good secondary school mathematics program.

At the national level, The National Council of Teachers of Mathematics has developed Curriculum and Evaluation Standards that reflect a vision of what a mathematics program should be. Suggestions for implementing the standards are included.

In addition to the state and national frameworks and standards, several of the curriculum development projects, such as the University of Chicago School Mathematics Project, have developed frameworks and descriptions of their programs that can serve as sources of ideas.

What materials are available that have been evaluated for their impact on student performance?

The National Diffusion Network (NDN)

The NDN provides funds to disseminate exemplary programs and materials. Before a program can be included in the NDN program, it must be approved by a review group, the Program Effectiveness Panel. A program requesting a review must provide evaluation data that indicate the program was effective in the school in which it was developed or field tested and that it could be used successfully in other schools.

Programs or materials that are judged effective are summarized in the Department of Education publication *Education Programs That Work* (Education Programs..., 1988); updated editions are produced periodically. Secondary mathematics programs included in the 1988 publication are: (1) Calculator Math a supplementary program for grades 7-9; (2) CAMEL: Calculator Assisted Mathematics for Everyday Living, a curriculum to increase the skills of general mathematics students; (3) Competency Based Program for Mathematics Mastery, an individualized diagnostic/prescriptive remedial math program for grades 7-8; (4) Conceptually Oriented Mathematics Program, an outcome-based objective-oriented mastery program for grades 1-8 which has also been used in grades 9-12; (5) Cross-Aged Structured Tutoring Program for Math, a pull-out program for grades 2-8; (6) Decision-Making Math, a program for improving problem-solving skills in grades 7-9; (7) HOSTS Math: Help One Student to Succeed, a diagnostic/prescriptive/individualized approach which has been used successfully in middle and junior high schools; (8) Micro/Math, a problem-solving program integrating computer-based career unit for grades 7-9; (9) M2C: Math Motivational Centers, a pull-out program providing intensive remedial instruction in grade 9; (10) Project DPI, a diagnostic, prescriptive, individualized program for grades 7-9; and (11) Go-Metric: Supplemental Low-Cost Metric Curriculum, for use in grades 5-8.

The National Science Foundation (NSF)

The National Science Foundation is providing support for the development of several secondary school mathematics programs. All materials developed go through trials with pupils before they are released for use by schools. A variety of programs are funded supporting course and material development. Recent projects supported are listed in the Directory of Awards (1989). Additional projects have been given support.

What are other sources of programs and materials with evaluation data?

The Educational Products Information Exchange (EPIE) is a non-profit organization that reviews and evaluates educational materials. EPIE produces a newsletter and special publications that include evaluation information on a variety of curriculum materials including mathematics. A listing of EPIE materials can be obtained by writing to EPIE.

Some of the Regional Educational Laboratories sponsored by the U.S. Department of Education produce and/or review mathematics materials. The Northwest Regional Educational Laboratory, for example, reviews and evaluates computer software, including those related to mathematics. They publish the results of their reviews on a regular basis.

States such as New York and Pennsylvania produce mathematics materials for schools that have had extensive evaluation. Some states such as California and Texas publish reviews of textbooks.

The ERIC database contains materials, descriptions of programs, and evaluation data related to many programs.

What are other sources of information about promising programs and materials?

Some programs and materials have been found to be effective for improving learning, but have not been reviewed by an outside organization or agency. Based on their use and reported results, they are considered promising programs and materials and worthy of consideration by others.

The National Council of Teachers of Mathematics has two publications focused on secondary school promising and exemplary programs. One considers alternative courses for secondary school mathematics (Suydam et al., 1985).

Seventy-four courses are listed, with information on grade level or length, site, date first taught, students allowed to enroll, why developed, objectives, prerequisites, course it precedes, persons involved in development, materials used, community resources utilized, teaching modes, special teaching skills/experience, number of students enrolled/completing, evaluation and indication of success, changes considered; course outline with topics and time; and contact person. The other NCTM publication presents ten case studies of exemplary mathematics programs, nine of which concern middle or high schools. Descriptions are given of each program, with much detail on features which appear to make them exemplary.

The COSMOS Corporation (White, 1986) worked with the National Council of Teachers of Mathematics and other groups to identify programs and materials that were considered effective. The catalog published in 1986 contains more than 40 descriptions of programs, materials, and practices for secondary school mathematics.

The Title II program of the Education for Economic Security Act has supported the development of many promising programs and materials. A recent document published by the United States Department of Education contains over 80 project summaries from projects funded in 39 states and the District of Columbia (Exemplary Projects. Mathematics-Science..., 1988). Included are several secondary school mathematics projects.

Secondary school mathematics programs and materials are also being developed with funds from the U.S. Department of Education Eisenhower Act. The Abstracts of the 1989 and 1988 Awards: Dwight D. Eisenhower Mathematics and Science National Programs (Levinson, 1989) include 27 secondary programs with mathematics components.

There are a variety of programs and materials available that make use of new technology. Software has been and is being developed for secondary school programs. Integrated learning systems have been developed for secondary school mathematics. Distance learning programs (including the STAR School Project) also include materials for secondary school mathematics education. Linking for Learning (1989) and Online: Computers in Education (1989) describe several examples.

The ERIC Clearinghouse for Science, Mathematics, and Environmental Education (ERIC/SMEAC) has contacted (1) state, county, and local coordinators and curriculum specialists for mathematics and (2) federal program staff for nominations of programs and materials they consider promising and exemplary. In addition, association programs, newsletters, journals, and materials received at ERIC/SMEAC have been reviewed for programs and materials.

From these sources, possible programs and materials are being identified and schools and projects involved with these activities are being contacted to obtain information about the programs and materials and actual materials when available. A description of a selection of the programs and materials related to secondary school mathematics will be published in 1990.

ERIC/SMEAC plans to produce supplements to the 1990 publication when additional programs and materials are identified. Nominations for programs and materials should be sent to ERIC/SMEAC.

What are some good ways to begin?

Some sources of information and publications that include programs and materials described in this digest are listed. In addition, you should contact your state coordinator or specialist in mathematics education; many states have started reform activities and you should determine what your state and schools in your state are doing and resources that are available.

Selected Information Sources

National Science Foundation
Division of Materials Development, Research and Informal Science Education
1800 G Street, NW
Washington, DC 20550

Northwest Regional Educational Laboratory
101 Southwest Main Street
Portland, OR 97204

National Diffusion Network
555 New Jersey Avenue, NW
Washington, DC 20208-1525

EPIE Institute
P.O. Box 839
Water Mill, NY 11976

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OnLine: Computers in Education. What's Happening? What's Possible? Jostens Learning Corporation, San Diego, CA, 1989.

Suydam, Marilyn N., John Dossey, Marilyn L. Hala, Genevive M. Knight, & Jack D. Wilson. *Alternative Courses for Secondary School Mathematics*. National Council of Teachers of Mathematics, Reston, VA, 1985.

White, J. Lynne, ed. *Catalog of Practices in Science and Mathematics Education*. COSMOS Corp, Washington, DC, 1986.

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